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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS IN THE FOUR NOTCH PROPOSED WILDERNESS STUDY AREA ON THE NATIONAL FORESTS IN TEXAS

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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS IN THE FOUR NOTCH PROPOSED WILDERNESS STUDY AREA ON THE NATIONAL FORESTS IN TEXAS

by

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ABSTRACT

Aerial surveys and ground checks of approximately 5000 acres consisting of approximately 5000 acres of susceptible host showed fifteen multiple tree southern pine beetle spots in the Four Notch area (3 spots per 1000 acres). An estimated 112 MBF are currently infested with a potential for an additional 454 MBF loss without a control effort.

INTRODUCTION

A biological evaluation was conducted in proposed wilderness areas in the National Forests in Texas the week of July 14, 1980. The evaluation was conducted by personnel of Forest Insect and Disease Management, State and Private Forestry, U.S. Forest Service. Aerial survey was completed by Raven District personnel, Texas National Forests. The purpose of this evaluation was to determine current and future status of the southern pine beetle (Dendroctonus frontalis Zimm.) activity within proposed wilderness study area of the National Forests in Texas.

TECHNICAL INFORMATION

The southern pine beetle attacks all species of southern yellow pine on the Texas National Forest, loblolly pine, Pinus taeda L., and shortleaf pine, Pinus echinata Mill., are the preferred hosts.

Type of Damage

Damage caused by the southern pine beetle is tree mortality resulting from adult beetles constructing egg galleries in the cambial region of the host trees. Blue-staining fungi (Ceratocystis spp.), introduced by the beetles and secondary insects, accelerate the kill by blocking the vascular system of the tree.

Life Cycle of the Insect

The beetles attack and construct winding egg galleries in the cambium. White larvae hatch from eggs deposited along the galleries and further mine the cambium. Pupal cells are constructed in the outer bark from which adult beetles emerge. During the warmer months, the life cycle is completed in about 30 days. There may be as many as seven generations each year.

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Aerial Survey and Ground Checks

Southern pine beetle spots were sketch mapped by district personnel. Basal area, seasonal mode of activity, age, DBH and numbers of infested trees were recorded for all SPB spots that were ground checked (see maps at end of this report for infestation locations).

RESULTS

Aerial and Ground Surveys

Aerial sketch mapping revealed the numbers of SPB spots thought to be active immediately prior to the biological evaluation. The Raven District (Four Notch area) had fifteen SPB spots. These spots ranged in size from 10 trees to over 100 trees. The majority of the spots (8) were in the 50-100 tree size class. Eight spots were ground checked by personnel from FI&DM, Pineville, Louisiana. Ground check data is summarized in Table 1. All ground checked SPB spots were active. The number of active trees ranged from 1-75. Six of the sample spots had all stages of southern pine beetle (i.e. adults, pupae, larvae and egg stages) present.

Hazard Rating

Hazard rating was done to determine the potential for SPB losses in a particular area. Generally, any forest condition that causes stressed trees will increase the chance for SPB attack. Some of these stand characteristics are: timber stands with a high pine basal area, soil or site conditions that result in frequent drought or flooding, and increasing stand age (older trees are likely to be less vigorous).

All of the SPB spots ground checked were hazard rated (Mason 1979). This should provide an indication of where future SPB attacks are likely to occur. Results of the hazard rating are shown in Table 1. Note that while some of these areas had spots going inactive, (a small number of green infested trees present) they still rated a high or very high hazard area for southern pine beetle loss.

Spot Growth

Most of the sites examined were hazard rated in the high and very high categories. Once the potential for loss was determined, each spot was evaluated using a spot growth formula developed in East Texas. Table 2 presents expected losses for each spot for the next 180 days. These losses are expressed in terms of active trees per 30 day period, cumulative emerged (vacated) trees per 30 day period and the total cumulative spot size per 30 day period.

Table 1. Summary of Ground Check Data for the Proposed Wilderness Study Area (Four Notch Area, Raven District) on the National Forests in Texas)

Spot No.	Average Age(Approx.)	Species	$\bar{x}$ DBH	$\bar{x}$ Ht.	No. of Infested Trees	Green to Red Red	Pine/Hardwood Basal Area	Site	Hazard[a/] Rating
1	99	Shortleaf	18"	110	75	4.36:1	80/50	Upland Flat	Moderate
2	60	Shortleaf	18"	80	44	3.40:1	130/40	Upland Flat	Very High
3	60	Loblolly	22"	85	1	N/A	90/40	Upland Flat	Very High
4	60	Shortleaf	12"	90	28	1.8:1	100/20	Upland Flat	High
5	63	Shortleaf	18.5"	85	15	1:3	120/30	Upland Flat	High
6	58	Shortleaf	18"	85	1	N/A	160/20	Upland Flat	Very High
7	64	Loblolly	19.6"	90	21	21:1	110/60	Upland Flat	High
8	70	Loblolly	20.3"	96	11	4.5:1	110/10	Upland Flat	Very High

a/ This methodology was developed in East Texas by Dr. Garland Mason. It is being used on a trial basis and is considered to give an indication of the susceptability of an area to attack by the southern pine beetle.

Discussion

SPB activity in Texas has been endemic or near endemic from 1977-1979. Several SPB infestations have been discovered recently by aerial surveillance flights. These infestations were found on the San Jacinto District, Raven District and Neches District of the National Forests in Texas. Pineville Field Office, Forest Insect and Disease Management personnel later ground checked the spots that were used for projecting spot growth.

While an epidemic is not yet underway, the potential exists due to the large number of susceptable stands of pine timber. Large areas of old growth high density timber such as that found in the Four Notch area are susceptable to SPB attack. If infested this area will contribute to the overall SPB population and subsequent timber loss in other managed stands if not controlled. Table 2 shows that spots numbered 1, 2, 4, 5, 7 and 8 will be active after sixty days if no action is taken. After 180 days, spot numbers 1, 2, and 7 will still be active. Therefore, based on this sample, 75% of the 15 spots detected will be active after 60 days and 38% of the spots will be active after 180 days. As shown by table 2, large spots (25 active trees) cause the most loss and remain active for the longest period of time.

These large spots are the spots which will require treatment. Control priorities for each individual southern pine beetle spot should be established. (Billings and Pase). Treatment of spots with less than 10 active trees is not recommended. It's been shown that about 70% of these spots go inactive within one month.

Alternative 1. Pesticides

The chemical formulations recommended for southern pine beetle control are lindane or Dursban® 4E. Infested trees are felled toward the center of the spot, cut into workable lengths and thoroughly sprayed.

Limitations to this method are: 1) to be effective, all bark surfaces must be sprayed (this involves turning the logs which will be difficult due to the size of the trees involved), and 2) the adverse effect of the insecticide on nontarget organisms in the sprayed trees.

Use of pesticides in the proposed area would be effective but may not be a viable alternative due to management constraints. Should pesticide treatment be needed, FIDM personnel should be contacted to provide training and other technical assistance prior to and during project implementation.

Alternative 2. Do nothing and allow the infestation to follow a natural trend.

SPB populations are cyclic. When they increase, large numbers of susceptable

Table 2. Spot Growth Projections for SPB on the Four Notch Area

SPOT	0	30	60	90	120	150	180	
	**********	DAYS AFTER	DETECTION		**********			
1	75	67	58	50	43	35	28	ACTIVE TREES
	0	61	115	162	203	238	266	EMERGED TREES
	75	127	173	213	246	273	294	SPOT SIZE
2	44	47	51	55	61	67	75	ACTIVE TREES
	0	36	74	115	160	209	263	EMERGED TREES
	44	83	125	170	220	276	339	SPOT SIZE
3	1	0	0	0	0	0	0	ACTIVE TREES
	0	1	1	1	1	1	1	EMERGED TREES
	1	1	1	1	1	1	1	SPOT SIZE
4	28	19	11	3	1	0	0	ACTIVE TREES
	0	23	38	47	50	50	50	EMERGED TREES
	28	42	49	50	50	50	50	SPOT SIZE
5	15	10	4	1	0	0	0	ACTIVE TREES
	0	12	20	24	24	24	24	EMERGED TREES
	15	22	24	24	24	24	24	SPOT SIZE
6	1	0	0	0	0	0	0	ACTIVE TREES
	0	1	1	1	1	1	1	EMERGED TREES
	1	1	1	1	1	1	1	SPOT SIZE
7	21	19	17	13	10	5	1	ACTIVE TREES
	0	17	32	46	57	65	69	EMERGED TREES
	21	36	49	59	67	70	70	SPOT SIZE
8	11	3	1	0	0	0	0	ACTIVE TREES
	0	9	12	12	12	12	12	EMERGED TREES
	11	12	12	12	12	12	12	SPOT SIZE

pine species are killed. This can occur for several years before the SPB population and subsequent mortality will decline. The Four Notch area appeared to be of uniform, age and species composition, thus we can expect this cyclic activity will continue periodically until transition to a climax forest occurs.

Alternative 3. Remove trees through salvage.

Salvage is the method most often used for stopping the growth of existing spots. This strategy in order of priority involves: 1) removing a buffer strip of non-infested trees at the head(s) of the spot, 2) all green and red infested trees, and if desired, 3) the trees already killed by the beetles.

To implement this alternative, the buffer strip should be cut first. The buffer strip consists of uninfested pine trees adjacent to and ahead of the green infested trees. It can vary in size from 10-70 feet. This practice is effective in reducing the possibility of "breakouts". There are three major reasons for cutting the buffer strip. They are: 1) to insure that green infested trees which may have escaped detection are removed from the stand, 2) any delay between marking the spot and harvesting does not result in the spot spreading beyond its marked boundaries, and 3) to insure that beetle activity in the area is disrupted.

The size of the buffer strip needed to prevent spots from continuing to grow depends on three factors:

1) The length of time it will take to remove or treat the trees in a spot.--if the buffer is not removed within 2 weeks of marking, another visit and talley must be made in order to insure removal of all infested trees.

2) The size of the original spot. Larger spots have larger SPB populations. Larger populations of SPB make control efforts more difficult. Also, it takes longer to remove the high timber volume in a large spot.

3) The intensity of survey after the spot is cut. Where spots are visited infrequently the buffer strip should be larger.

After the buffer strip is cut, all infested trees should be felled toward the center of the spot and removed to prevent infestation of adjacent trees. Unmerchantable trees should be left at the spot.

Each area should be checked once cutting and removal of the infested timber is finished. If any newly infested trees are found they should be marked and cut. Each area should then be post control ground checked at least once more and the area watched during aerial surveillance to ensure that no "breakouts" occur.

This procedure is limited by weather, soil conditions, and the loggers willingness to follow the project control plan. Trees damaged during logging are high risk trees and should be removed. It is advisable to use loggers that are familiar with the salvage procedure and careful about damaging residual trees.

Alternative 4. Removal of only buffer and infested trees

This is similiar to Alternative 3, except that only the buffer strip and currently infested trees would be cut. Size of the buffer, cutting priorities, and methods would be the same as in Alternative 3. All vacated trees would be left standing. This would favor predators and parasites of the SPB. The limitations would be the same as for Alternative 3. However, since fewer trees will be removed, there will be less logging impact to the site and less chance of damaging the residual stand.

Alternative 5. Cut-and-leave infested trees.

This is accomplished by felling a buffer strip, and all infested trees toward the center of the spot. The buffer will be as wide as the average of the trees in the spot. Vacated trees should be left standing to allow development of SPB parasites and predator. Use of this method terminates spot growth by causing the beetle to disperse. This results in a reduction of mass attacked trees and spot growth ceases. The limitations with this control tactic are: 1) it can only be used in the summer (May 1 - September 30) since these are the only months beetles are not dispersing, 2) it should only be used on small spots, normally 40 infested trees or less.

Alternative 6. Pile and burn

Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph one of Alternative 3. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" , every effort should be made to locate and treat all green infested trees during the piling and burning operation.

RECOMMENDATIONS

SPB losses can be reduced by using any of the alternatives 1, 3, 4, 5 and 6. Our understanding is that the resource management objective of this area is to maintain the present wilderness characteristics. Alternative 4 best accomplishes this objective with minimal losses and impact to the area. For all spots with less than 40 trees, where the spot is unmerchantable and/or inaccessable, Alternative 5 will accomplish the objective. Care should be taken to insure that all spots treated have greater than 10 active trees.

PESTICIDE PRECAUTION

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key-- out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, and beneficial insects, fish and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothes and:

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds. streams or wells. Because it is difficult to remove all traces of herbicide from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your country agricultural agent or state extension specialist to be sure the intended use is still registered.

REFERENCES

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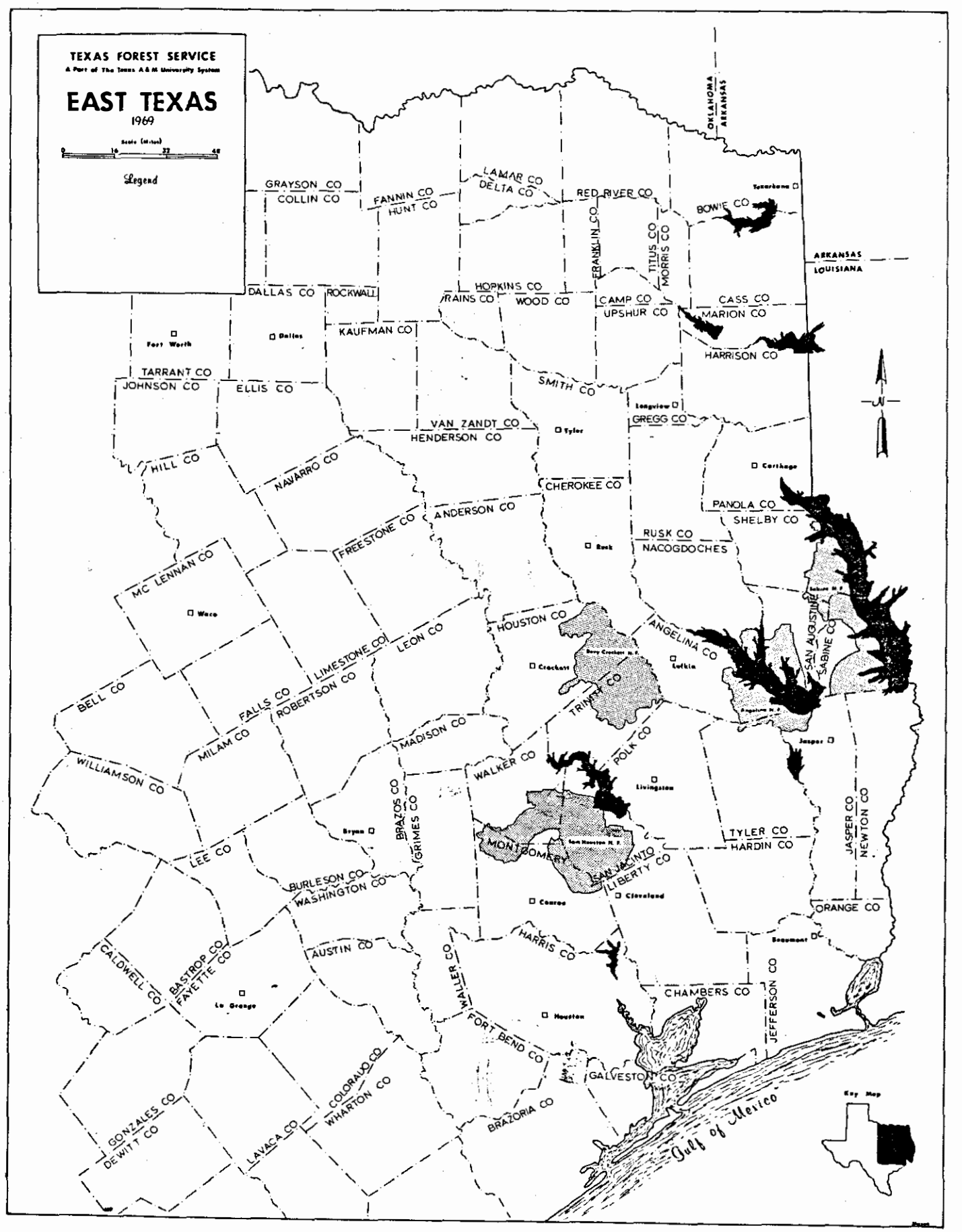
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Longview
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Jasper
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GRIMES CO
Bryan
TYLER CO
HARDIN CO
JASPER CO
NEWTON CO
MONTGOMERY
SAN JACINTO
LIBERTY CO
LEE CO
BURLESON CO
WASHINGTON CO
Cleveland
Conroe
ORANGE CO
Beaumont
CALDWELL CO
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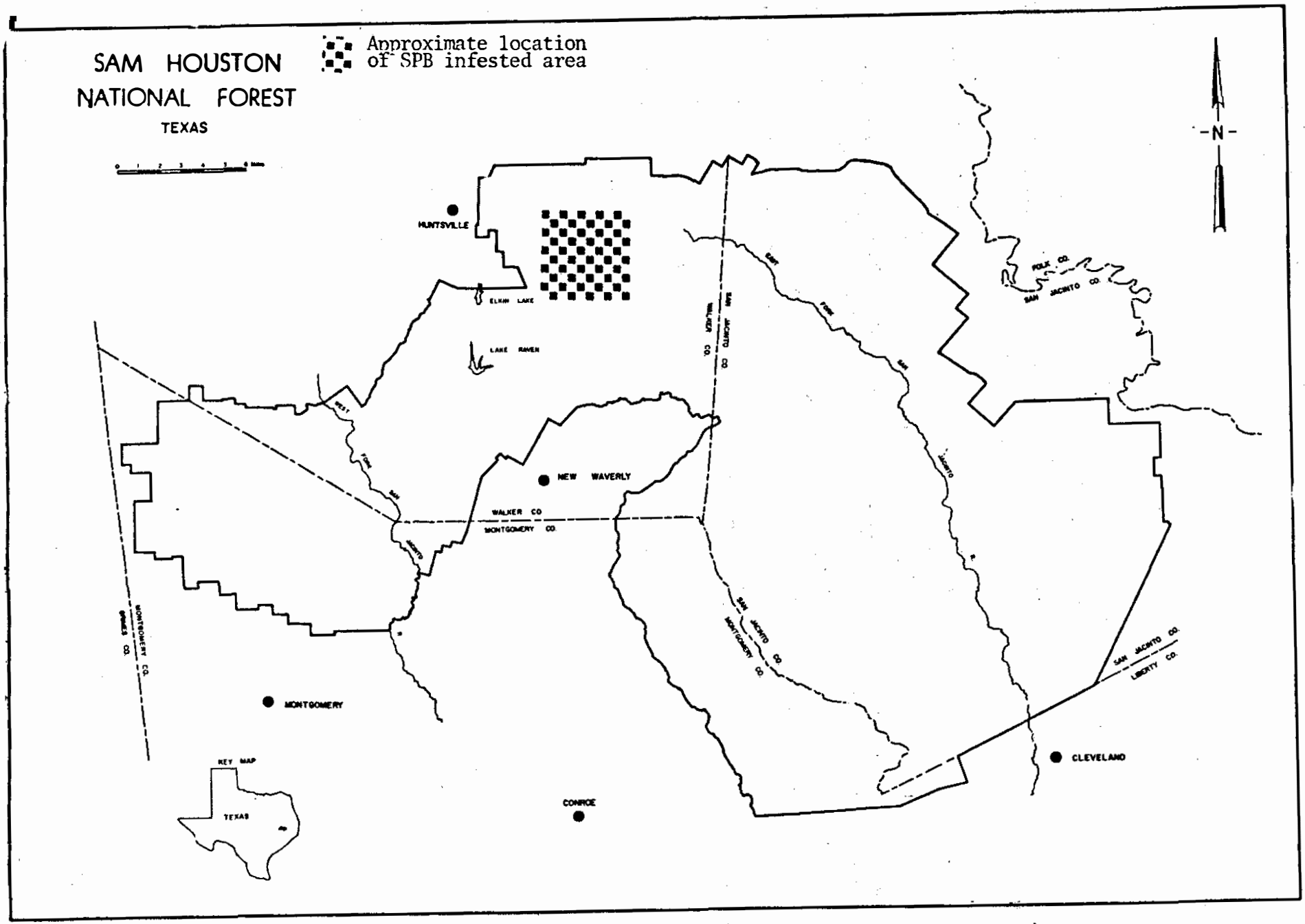
FAYETTE CO
AUSTIN CO
HARRIS CO
WALLER CO
CHAMBERS CO
La Grange
Houston
FORT BEND CO
JEFFERSON CO
GALVESTON CO
GONZALES CO
DE WITT CO
COLORADO CO
WHARTON CO
LAVACA CO
BRAZORIA CO
Gulf of Mexico
Key Map


SAM HOUSTON
NATIONAL FOREST
TEXAS
Approximate location
of SPB infested area
N
HUNTSVILLE
ELKIN LAKE
LAKE RAVEN
NEW WAVERLY
WALKER CO
MONTGOMERY CO
MONTGOMERY
CONROE
CLEVELAND
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WALKER CO
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MONTGOMERY CO
KEY MAP
TEXAS